

PORTRAIT OF
(Engineered)
RELIABILITY

**BATTERY
ACTUATED
CHART
DRIVE
MODEL 301**

Cannon
Battery actuated chart drive.
Replace Power-Pack twice
annually, or when voltage is
below 2.0. Clean and reoil with
Moeblus #5 every three years.
Kingmann-White, Inc.

RED TERMINAL IS PLUS
POWER-PACK
3 Volt

Manganese - Alkaline
BATTERY
for

CHART DRIVES & INTEGRATORS

Temperature range -35° to +160° F.

Part No. 20-501-21

KINGMANN-WHITE, INC.
PLACENTIA, CALIFORNIA



KINGMANN-WHITE, INC.
PLACENTIA, CALIFORNIA

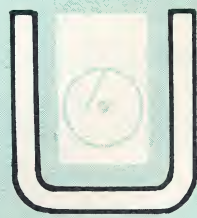
Introduction

For over a century, hand-wound spring actuated chart drives and, more recently, synchronous motor powered chart drives, have been used to turn charts on recorders. Although many improvements in design and manufacture have been made, frequent maintenance, lost records due to clock stoppage, high installation costs for the synchronous style and other problems still exist. Instrument users have long searched for a way to eliminate these costly problems.

An extensive re-examination conducted by Kingmann-White, Inc. engineers has produced a vastly improved Cannon Model 301 Battery Actuated Chart Drive which is now a true solution to the many inherent limitations and problems existent in the previously used hand-wound, and synchronous motor powered chart drives.

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PLACENTIA, CALIF.**



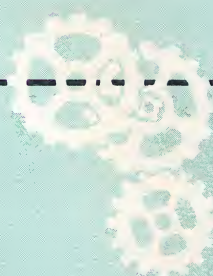
Update your Recorders

with IMPROVED CANNON BATTERY
OPERATED CHART DRIVES



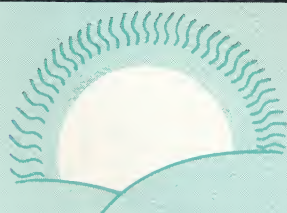
Economy...

Cannon chart drives pay for themselves in reduced maintenance costs, and reduction of losses from measurement inaccuracy.



Accuracy...

Timing accuracy 60 seconds per day or better, throughout battery life. Flow measurement is no better than timing accuracy. It can cost you over \$1400 per year!



Reliability...

Cannon chart drives eliminate lost records caused by clock stoppages. Operating temperature range -35° to $+160^{\circ}\text{F}$.

WHAT IS IT

The Model 301 Battery Actuated Circular Chart Drive replaces standard chart drives now in use in almost all circular chart recorders. The economy of a battery actuated drive is significant. The cost of explosion-proof housing or running electric power to remote locations for new installations is eliminated. Man hours now expended winding hand-wound drives are saved. Lost records from stalling are a thing of the past.

The Cannon Battery Actuated Chart Drives are available in many different rotational speeds, as well as revolving in either clockwise or counterclockwise direction. High-torque units are also available for high speed charts and intermitters.

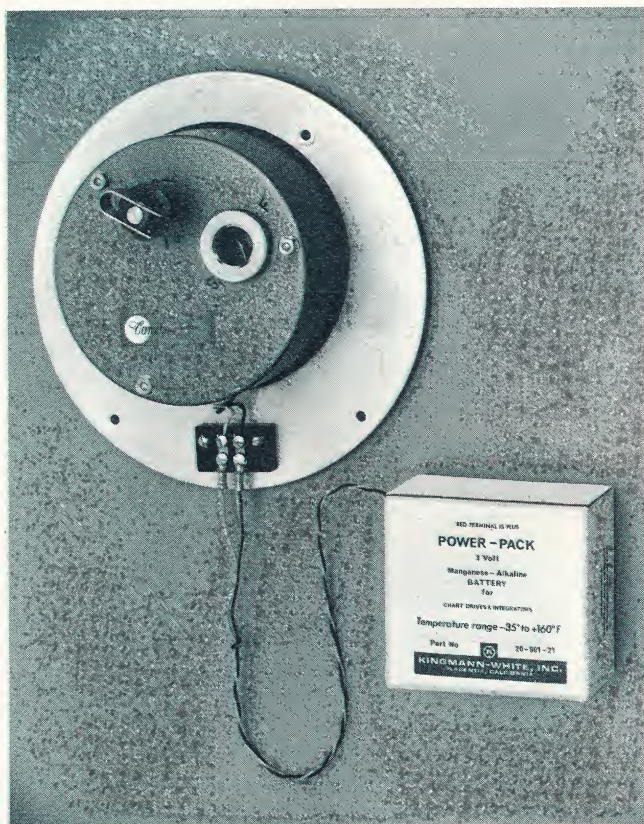


FIGURE 1

Chart Drive with Power-Pack

HOW IS IT POWERED

The Cannon Model 301 Chart Drive is now energized by a special manganese-alkaline dry cell Power-Pack. The Power-Pack has a waterproof case, all connections are soldered and the assembly is potted in waterproof plastic.

The Model 301 Chart Drive may be used in Class I, Division I areas without an explosion-proof housing because the electrical system is intrinsically safe.

WHAT DOES IT DO

The Cannon Model 301 Chart Drive eliminates loss of important records caused by clock stoppages; it reduces cost of maintenance on chart drives; it reduces installation costs compared to synchronous drives.

The Model 301 Chart Drive will run for more than six months to 1½ years on one Kingmann-White Power-Pack. The working temperature range is -35° to $+160^{\circ}\text{F}$.

The High-torque Model 301A is available for high speed rotation of charts, up to one revolution per hour, (see Specifications). It has ample power to drive 24 hour lift intermitters and timing sequence intermitters. Its use in these applications eliminates the need to visit the installation for rewinding the clock. The Model 301A will run about 1/3 as long as the Model 301 on a Kingmann-White Power-Pack.

HOW DOES IT WORK

The main spring is wound every 45 to 20 seconds by a solenoid. As the main spring nears the end of the cycle of delivering torque to the gear train, a pair of gold plated contacts engage, energizing the solenoid which then rewinds the main spring.

The main spring torque is transmitted through a precision machined gear train to the output shaft. The rate of rotation is regulated by a corrosion-resistant, jewelled escapement with a non-magnetic balance wheel. Timing accuracy is better than 60 seconds in 24 hours. The gradual reduction of battery voltage shortens the interval between winds of the main spring, thereby preventing **any** alteration of the **timing accuracy**.

The automatic rewinding of the main spring produces a constant level of torque (see Specifications) which not only insures timing accuracy, but practically eliminates bearing and gear wear found in hand-wound, spring driven equipment. In hand-wound units torque, when the spring is wound fully, must be **very** high to store enough energy to run until it is time to rewind. Actual torque required for chart rotation is about 2 inch-ounces (3 inch-ounces for damp charts). When fully wound, hand-wound drives must have approximately 220 inch-ounces of initial torque. This high initial torque creates wear in the bearings, gears and the pins of the escapement.

In the Cannon Model 301, on the other hand, no such excessive torque is present so wear is eliminated. The elimination of excessive torque, and high bearing and tooth pressure, means lubrication is far less critical. Therefore, maintenance is reduced. In recent life tests, under field conditions, Model 301 Battery Actuated Chart Drives operated the equivalent of more than 9 years without measurable wear and were still running perfectly when the tests were terminated.

WHAT RECORDERS DOES IT FIT

The Cannon Model 301 Chart Drive is dimensionally interchangeable with almost all ordinary chart drives. It comes equipped with a 1/2" diameter quick-lock chart hub, figure 3, 3 mounting posts, 3 mounting screws and the 3.0 VDC Kingmann-White Power-Pack, figure 2. The Model 301 is interchangeable with all Rockwell (MacNick) and most Lux, Seth Thomas or Bristol chart drives. For other drives and special recorders, adapters are available from your Kingmann-White sales representative or from Kingmann-White, Inc. in Placentia, California. See page 7.



FIGURE 2

Kingmann-White Power-Pack

WHAT ABOUT BATTERIES

In other than mild climates, the use of a battery powered chart drive was impractical until very recently because of the unavailability of truly reliable low/high temperature dry cell batteries. The appearance of the Cannon Model 301 Battery Actuated Chart Drive followed closely upon the development of a special low/high temperature dry cell. Unfortunately, as many as 50% of the original manganese-alkaline cells, in early versions, had serious problems of short shelf life and case leakage. These troubles understandably caused

many doubts about battery chart drives because the blame was placed on the chart drive when the fault was almost always the battery power supply.

Now, however, with recent vast improvements in certain **specific** manganese-alkaline cells, Kingmann-White is able to produce a highly reliable, 3 VDC Power-Pack for the Model 301 Chart Drive. With it, the inherent reliability and advantages of the Cannon Chart Drive are, for the first time, fully available for **all** field operating conditions. These are available from your Kingmann-White representative or may be obtained from Kingmann-White, Inc. in Placentia, California.

It is usually recommended that the Kingmann-White Power-Pack be replaced after 6 months operation. The six month figure is quite safe and covers severe operating conditions. The actual length of battery life in the Power-Pack depends largely upon temperature. Both the temperature at which the battery was stored **before** installation and the temperature of the battery during usage will influence its life. For example, dry cells in storage at 70°F. will lose about 8% of their charge per year, but at 115°F., the rate increases to 25%. Consequently, batteries changed in 6 months, in many cases, will still have substantial usable life. If the user wishes to get maximum life from the Kingmann-White Power-Pack, replacement can be determined by the voltage of the Power-Pak. When voltage declines below 2.0 Volts, replacement is recommended.

Under moderate operating temperatures the life of a Kingmann-White Power-Pack can be expected to be up to 1 1/2 years.

HOW ABOUT SOUR GAS SERVICE

Hand-wound spring drives suffer extensive failures in sour gas atmosphere mainly from the deterioration of the lubricant by the H₂S in the air. With the high torque always present in the hand-wound drive, lubricant failure results in prompt clock stoppage.

The Cannon Model 301 Chart Drive does not operate with this excessive torque. For this reason, the alteration of the lubricant by the H₂S will not seriously affect the Cannon Battery Actuated Chart Drive. The parts may tarnish and wear may be increased some, but the effects are much less than with ordinary chart drives.

Field experience has shown clearly the Cannon Model 301 Chart Drive will outlast many times over the conventional hand-wound spring-driven chart drive in sour gas field service.

WHAT ABOUT INTRINSIC SAFETY

The recommended practice RP 12.2, recently issued by the Instrument Society of America entitled "Intrinsically Safe and Non-Incendive Electrical Instruments," sets forth the requirements for intrinsically safe devices for industrial practice. This concept is new in the United States but has long been recognized in Europe and Canada.

Broadly speaking, intrinsic safety means the electrical apparatus is **incapable** of releasing **sufficient** energy to ignite an explosive gas mixture. In this country, good operating practice has **assumed any** spark could cause ignition. EXTENSIVE tests made abroad (and, more recently in the U.S.) prove this is NOT TRUE. If the energy released is less than 0.25 millijoules (this has a generous safety factor), refinery gas-air mixtures **cannot** be ignited by the electrical spark.

Furthermore, when the DC voltage under any conceivable circumstance is below certain established levels, the apparatus is automatically considered safe. Canada, for example, considers 30 VDC to be maximum. In the U. S. 10 VDC is being accepted as the safe level. 110 VAC power stepped down to under 10 VDC normally will not qualify because a fault in the transformer **could** raise the voltage above the permissible level. Battery power, with voltage below the established maximum, of course, qualifies perfectly in all cases.

The Cannon Model 301 releases less than 0.25 millijoules. Furthermore, the Model 301 Chart Drive has been tested and found intrinsically safe by an independent laboratory. The Model 301 Chart Drive, with cover removed, was operated for an extended time in an explosive mixture of hydrocarbon gas and air. NO ignition occurred. (Copy of Test Report available on request). Tests were also conducted in a hydrogen atmosphere. Consequently, theory and practice both conclusively prove the Model 301 Chart Drive is acceptable for hydrocarbon-gas or hydrogen atmospheres.

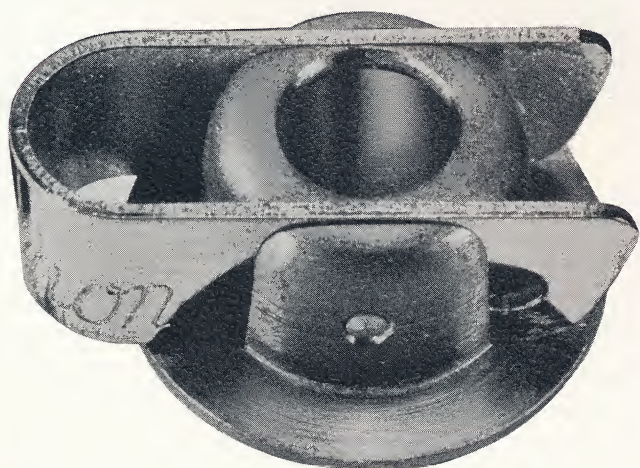


FIGURE 3

Chart Hub

WHAT ABOUT RELIABILITY

The Kingmann-White, Inc. totally re-engineered version of the Cannon Model 301 Chart Drive now contains a variety of improvements.

- Higher Main Spring Torque
- Improved Winding System
- Improved Electrical System
- Low Temperature—High Temperature Lubrication
- Three Volt Kingmann-White Power-Pack

The Model 301 Chart Drives are giving reliable performance in a wide variety of industries.

The Model 301 is warranted to be free of defects in material and workmanship for TWO years.

SERVICE POLICY

As with any precision clockwork mechanism, the Cannon Chart Drive should be cleaned and re-lubricated on a regular basis, with the interval dependent on the operating conditions. Usually, 3 years is suggested. This can be done by the user or a clock repairman.

To insure totally reliable field operation of the Model 301 series Battery Operated Chart Drives on an economical basis to the user, Kingmann-White, Inc. offers an exchange service plan. This reconditioning service includes all labor, material and parts necessary to correct normal wear and tear from field use. (Repair of physical or chemical damage is not included).

Reconditioned exchange units carry a ONE year warrantee.

VALUE ANALYSIS

Inaccuracy of timing **does** show up as flow measurement error. The present tendency is to ignore this as insignificant. **Look what it can mean!** Normal timing error in a **new** hand wound drive can result in a measurement error amounting to **\$250 per year** when the flow is only 1000 MCF/D and gas is worth 20c per MCF. When the drive is a year old, the error grows to **\$1400 per year!** Remember, these errors are for a rate of only 1000 MCF/D. The larger the flow, the larger the error.

For new, in-plant installations inside pneumatic or mechanically actuated instruments where power is not readily available, very substantial cost savings can be realized. If 50 feet of conduit and wire are required, the savings in the installed cost of the Model 301, instead of an electric drive, will exceed \$40.00. If 100 feet of wiring is required, the saving is about \$100. Break even distance is considered to be 15 feet. In Class I, Division I areas, of course, there is a large saving regardless of wiring distance as no additional explosion-proof enclosure is required.

Freedom from lost records, attainable only with the Model 301 Battery Operated Chart Drives is a cost factor that can easily justify their installation in a majority of cases.

SPECIFICATIONS

Cannon Model 301 Chart Drives (except SAMA style) are furnished with a 1/2" quick-lock chart hub, mounting posts and screws and a Kingmann-White 3 VDC Power-Pack. All are available CLOCKWISE as well as COUNTERCLOCKWISE.

Model No.	Rotation STANDARD	Usable Torque (Inch Ounce)
301-1	24 Hour	4
301-7	7 Day	23
301-8	8 Day	27
301-31	31 Day	100
	HIGH TORQUE	
301A-1	1 Hour	3.5
301A-4*	4 Hour	11
301A-6*	6 Hour	16
301A-12*	12 Hour	34
301A-24	24 Hour	68

*Available on special order.

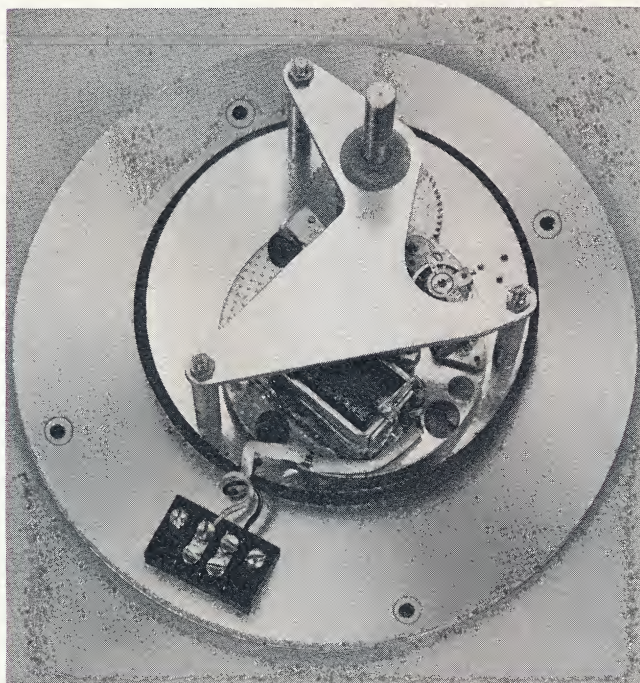


FIGURE 4

Internal View of Chart Drive

For any additional information on the Model 301 Battery Actuated Circular Chart Drive, contact Kingmann-White, Inc., 653 S. Melrose St., Placentia, California. Phone (714) 528-2111.

ADAPTERS FOR MODEL 301

NO ADAPTERS NEEDED when converting instrument fitted with Rockwell or MacNick Drives.

Adapter 21-301-6, supplied with each Model 301, required when converting an instrument fitted with Lux, Seth Thomas or Bristol Chart drives.

Table below shows adapters needed to convert from manufacturers standard chart drive to Model 301.

Instrument	Adapter Number
Arcco Instrument Company.....	none
American Meter Company.....	21-301-6*
American Shaeffer Budenberg.....	21-301-10
Bailey C-36	21-301-11
Barton 202 or 202A.....	21-301-6*
Bristol 40M and 55.....	21-301-6*
Bristol 500 Series 12".....	21-301-6*
Brown, rectangular case, pen control (CW).....	21-301-15
Brown 2 pen Flow Meter (CW).....	none
Brown 16R-20R (CW).....	none
Brown 27-R-68 (CW)	21-301-20
Canadian Meter Company.....	21-301-6*
Crosby	21-301-16
Emco	21-301-6*
Fischer & Porter (CW).....	21-301-19
Foxboro Type A & B, round case & Type C.....	21-301-7
Foxboro round case Type 4, 7, 8, 17, 20, 27, 28, 37, 200, 215, 7000.....	21-301-17
Foxboro rectangular case Model 30.....	21-301-18
Foxboro rectangular case Model 38, 40.....	21-301-26
Foxboro round case with chart plate clip.....	21-301-22
Gotham	21-301-13
Industrial Instrument Corporation.....	21-301-6*
Mason-Neilan Model 2000, 3000.....	21-301-17
Mason-Neilan Model 60,000 Controllers.....	21-301-21
Manning, Maxwell & Moore.....	21-301-10
Moeller	21-301-23
Palmer	21-301-25
Republic Flow Meter.....	21-301-12
Rockwell	21-301-6*
Tagliabue	21-301-12
Taylor 100 series, 761.....	21-301-9
Taylor case 11J, 30J.....	21-301-8
Tycos	21-301-8
Westcott Type D or W.....	21-301-6*
Westcott Type T.....	21-301-8
Westcott & Greiss.....	21-301-6*
Weksler	21-301-14
Weston	21-301-12
Wheelco	21-301-24

*Supplied with Drive.

OTHER KINGMANN-WHITE PRODUCTS



PULSATION SNUBBER

Prevents pressure gauge damage from pulsating pressure

Improves readability

Smooths flow measurement recording

Send for bulletin on Model 300

MODEL 14 UNIVERSAL RECORDER PEN

A complete conversion kit to fit all circular chart recorders. "Cannon" Mirro-Tip pen clips easily onto the existing pen arm. Ultra-flexible, bubble-free plastic feed tubing. Plastic ink Reservoir with $\frac{1}{2}$ oz. or $\frac{1}{4}$ oz. capacity, top outlet, complete with ink. Writes from 3 to 12 months with one filling. Reservoir hanger or mounting clip for installation on case with nut and screw.

Send for Bulletin BU-G4



FLOW INTEGRATOR KIT

Converts flow recorder to integrator

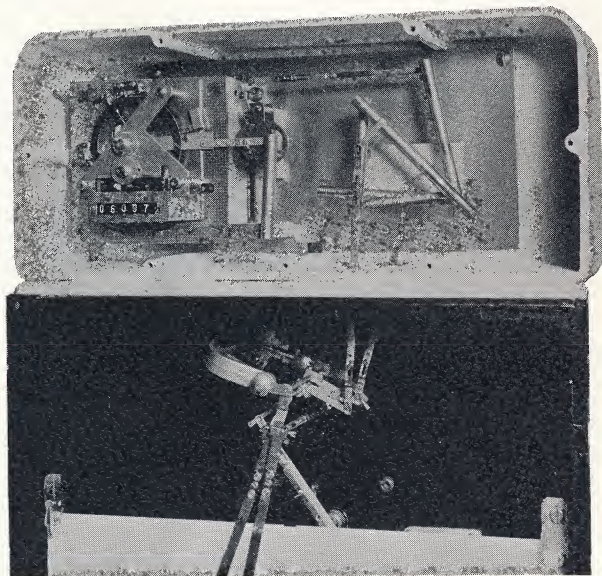
Eliminates chart integration, gives direct readout

Battery powered, 6 months or more operation with Power Pack

Pressure compensation

Improves flow measurement accuracy

Send for bulletin Model 501



KINGMANN-WHITE, INC.

Successor to L. J. Cannon Mfg. Co.

653 South Melrose Street
Placentia, California 92670



KINGMANN-WHITE, INC.
PLACENTIA, CALIF., 92670

MODEL 301D DRUM CHART DRIVE

MAY 16, 1966

PURPOSE

The Model 301D DRUM CHART DRIVE for rain or snow gauges, hygrothermographs, thermographs, barographs, and other meteorological or hydrographic recorders is BATTERY ACTUATED. It will operate for months with the KW Power-Pack. This unit incorporates the same field-proven, electromagnetic winding apparatus and jeweled escapement that have been driving circular charts for oil-field and industrial recorders for years.

OPERATION

The power is supplied by the KW 3VDC Power-Pack which will drive the unit for 6 to 18 months. The main spring is rewound by an electro-magnet every 25 to 40 seconds. Consequently, a constant output torque is generated to insure high timing accuracy and running reliability. The main spring torque is transmitted through a machined gear train and a Swiss precision jeweled escapement to provide sustained timing accuracy of 30 to 90 seconds per day.

FEATURES

The Model 301D DRUM CHART DRIVE will operate over an ambient temperature range of -35°F. to $+160^{\circ}\text{F.}$

The Model 301D does not require winding. Therefore, recorders need be visited far less frequently.

SPECIFICATIONS

The 5 MM mounting stud matches most spring wound drive units.

Interchangeable gears available to alter the drum rotation.

Conventional bar-type chart retainer.

Standard drum height is $6\frac{5}{8}"$; Other drum heights available are $3\frac{5}{8}"$, $5\frac{1}{8}"$ and $6\frac{7}{8}"$. Please Specify your Requirements.

Barographs & Rainfall Recorders

(Belfort/Bendix)

$3\frac{5}{8}"$ height required

Hygrothermograph (Belfort/Bendix)

$5\frac{1}{8}"$ height required

Thermograph (Belfort/Bendix)

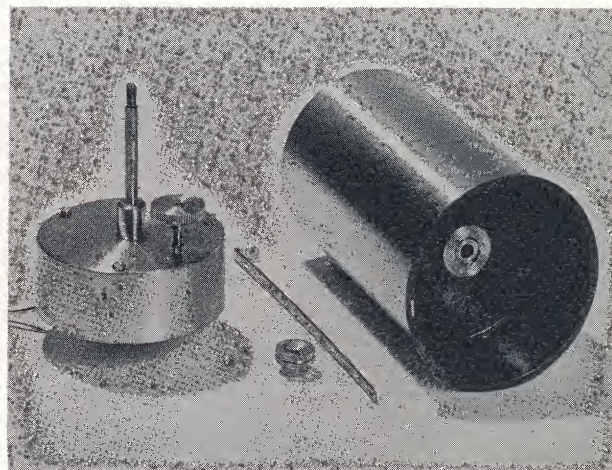
$5\frac{1}{8}"$ height required

Micro-barograph (Belfort/Bendix)

$6\frac{7}{8}"$ height required

Rain Gauge (Belfort/Bendix)

$6\frac{7}{8}"$ height required



Rotations

		Unit Price
6 hr.	} Interchangeable Gearing	\$ 55.00
12 hr.		55.00
1 day	} Interchangeable Gearing	52.00
7 day		52.00
31 day*		53.00
20-501-21	Power-Pack.	3.00
Set of extra rotation change gears		5.00

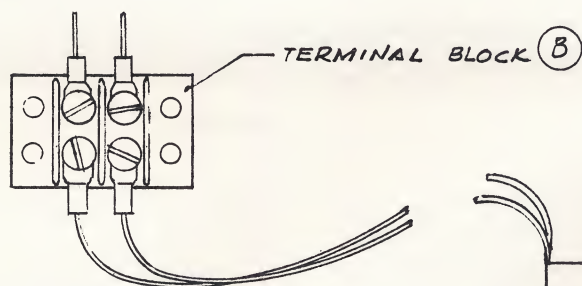
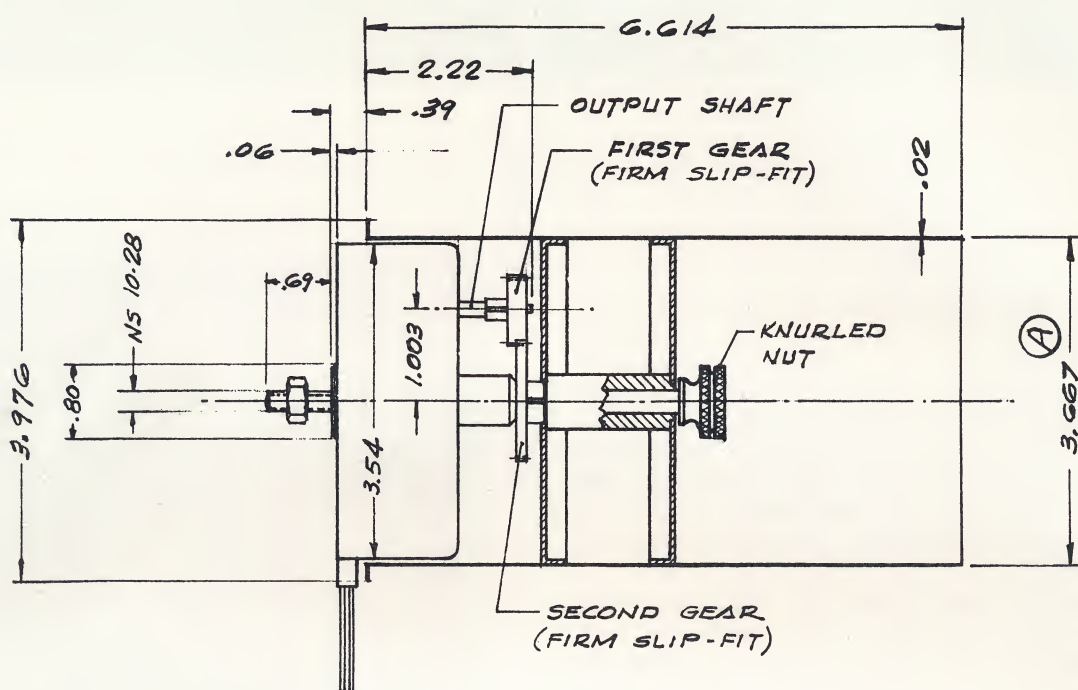
Prices are F.O.B. Placentia, California and subject to change without notice.

OTHER CANNON PRODUCTS

- Recording Pens, remote reservoir, bucket & "V"
- Temperature-stable Recording Inks
- Strip Chart Drives and Circular Chart Drives
- Integrators and Totalizers

SUCCESSOR TO L. J. *Cannon* MFG. CO., INC.

LITHO IN U.S.A.



DRUM ROTATION	FIRST GEAR	SECOND GEAR	BATTERY VOLTAGE
6 HR	63	63	3
12 HR	42	84	
24 HR	63	63	
7 DAY	16	112	
8 DAY	14	112	
31 DAY *	63	63	

* NOT INTER-CHANGEABLE W/OTHER ROTATIONS
 * 50 & 58 TOOTH GEARS AVAILABLE FOR 8.15MM PER DAY ROTATION
 * 360° ROTATION W/GEARING 63-63

B Appd CBN 5-25-65

UNLESS OTHERWISE NOTED TOLERANCES .X — ±.030 ANGULAR ±.5° .XX — ±.010 THREADS CLASS 2 .XXX — ±.005 MACH. SURF. $\sqrt{63}$ MACH. DIAS. CONCENTRIC WITHIN .010 T.I.R. BREAK ALL SHARP EDGES .015 MAX. MACH. FILLET RADIUS .020 MAX. MACH. SURF. FLAT WITHIN .001 IN/IN OTHER SURF. FLAT WITHIN .005 IN/IN DO NOT SCALE DWG.	MAT'L.	DRAWN R. TRAYLOR 3/17/64
	PROTECTIVE COATING	CHK'D.
KINGMANN-WHITE, INC. 653 SOUTH MELROSE AV. PLACENTIA, CALIFORNIA		APPR'D. C.B.N. 3-18-64
		APPR'D.
MODEL 301 D DRUM CHART DRIVE	SCALE	
	MODEL 301 D	
	SIZE A	DWG. NO. 00-301-2
		CHG. B